

REMARKS

The present Amendment formally presents the arguments in support of patentability that were discussed in the interview courteously afforded the undersigned counsel for the Applicant on May 7, 2003, at which the Examiner and her supervisor were present.

In the March 19, 2003 Office Action, the Examiner noted a typographical error in claim 1 that has been corrected.

Claims 3-5, 14 and 15 were rejected under 35 U.S.C. §112, first paragraph, as containing subject matter that was not described in the specification in such a way as to enable one skilled in the art to make and use the invention, because the Examiner stated the specification as originally filed does not provide information regarding the precise meaning of "overlap." Claims 14 and 15 have been cancelled, which are the only claims that use this term. The reason for including claims 3-5 in this rejection are not clearly understood and if necessary the rejection of those claims under §112, first paragraph can be discussed at the interview after receiving clarification from the Examiner. If claims 3-5 were included in this rejection solely because claims 14 and 15 depend from claim 3, then Applicant respectfully submits the rejection of claims 3-5 under §112, first paragraph has been overcome by the cancellation of claims 14 and 15.

If the rejection of claim 3 under §112, first paragraph was because claim 3 referred to "said section of said electrical conductor" whereas claim 1 referred to "at least one section of said electrical conductor," this inconsistency has been addressed by amending claim 3 in to include "at least one" therein preceding "section." Since the fact that the electrical conductor is composed of sections was set forth in claims 1, 4

and 5 as originally filed, and since the claims are a part of the original disclosure, the mere fact that the electrical conductor is described in the claims as being composed of sections cannot be unsupported in the original specification under §112, first paragraph. The last Amendment merely provided the adjectives “first” and “second” to improve the clarity of which sections were being referred to in the claims.

Claims 1-10 and 15 were rejected under 35 U.S.C. §102(b) as being anticipated by Furukawa, and claims 11-14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Furukawa. In substantiating the rejection of independent claim 1 based on the Furukawa reference, the Examiner referred to the vacuum vessel in the Furukawa reference that retains the gradient system as corresponding to the “carrier structure” of claim 1, because the Examiner stated the vacuum vessel fixes the electrical conductor in Furukawa in a cylindrical shape. The Examiner also referred to the resin 41 in Figure B of Furukawa and the resin 38b in Figure 5 of Furukawa as corresponding to a heat insulator disposed between at least one section of the conductor and the carrier structure, as set forth in claim 1 of the present application.

Claim 1 has been amended to make clear that the carrier structure fixes a configuration of the coil pattern of the electrical conductor. Applicant acknowledges that the term “coil pattern” is not explicitly used in the present specification, however, Figure 2 shows the electrical conductor embedded in the cast resin carrier structure 15a in the same manner as the cooling conduits are shown in the carrier 39 in Figure 3 of the Furukawa reference. The Furukawa reference uses the term “coil pattern” to describe both the arrangement of the coils of the shield coil unit 39 and the arrangement of the cooling pipes 38a in the paragraph beginning at column 4, line 34 of the Furukawa reference. Applicant therefore respectfully submits that those of ordinary skill in the art,

based on the specification as originally filed would have no difficulty in understanding that the cast resin carrier structure 15a does, in fact, fix the coil pattern of the electrical conductors.

The most that can be said of the vacuum vessel in the Furukawa reference is that it supports the overall gradient coil unit, and even if that unit is pre-cast to have a cylindrical shape, the vacuum vessel does nothing to “fix” that shape. The Furukawa reference explicitly discloses structure (i.e., the resin) in the aforementioned paragraph which performs the function of “fixing” the coil pattern or the winding pattern of the electrical conductors. Even if the vacuum vessel maintains the pre-cast cylindrical shape of the gradient coil system in the Furukawa reference, it does nothing to fix the coil pattern. Even if the vacuum vessel constrains the coil pattern to have the shape of a cylinder, this is not the same as “fixing” the coil pattern since there is an infinite number of coil patterns that can have a cylindrical shape.

Even without this added language in claim 1, however, claim 1 is submitted to be distinguishable and patentable over the teachings of the Furukawa reference. As noted above, the Examiner apparently believes that the resin 41 shown in Figure 3 and/or the resin 38b shown in Figure 5 correspond to the heat insulator of claim 1 of the present application. This not only contradicts the present specification, but also contradicts the teachings of the Furukawa reference. The subject matter disclosed and claimed in the present application is directed to overcoming the problem that the carrier structure, commonly composed of resin which the gradient coil conductors are cast, *conducts* heat, and is therefore subject to damage at the high currents and high temperatures associated with the operation of the gradient coil, rather than functioning as any sort of heat insulator. The resin is an *electrical* insulator, but it is *not* a heat insulator. This

problem, and the solution thereto, are described in the present specification in the paragraph beginning at page 3, line 9, and in the paragraph bridging pages 3 and 4.

The Furukawa reference makes no mention whatsoever of the resin 41, in which the windings 37a of the coil 37 are cast in Figure 3 of Furukawa, nor the resin 38b in which the cooling pipes 38a are cast, as having any heating insulating properties whatsoever. In fact, it would destroy the intended operation of the Furukawa reference if the cooling conduits 38a shown in Figure 5 were embedded in heat insulating material, because this would prevent those cooling conduits from having any effect whatsoever for cooling the arrangement. Since the same term "resin" is used to refer to the component 38b and the component 41 shown in Figure 3, it must be assumed that the resin 41 shown in Figure 3 similarly has no effective heat insulating properties. This is further substantiated by the embodiment shown in Figure 8, wherein the cooling pipe 54 flows completely around, on both sides, the windings 37a'. Although the cast resin above the windings 37a' is not provided with a reference numeral in Figure 8, there is no reason to assume that this is anything different than the resin 41 shown in Figure 3. If this resin had heat insulating properties, then no purpose whatsoever would be served by flowing the coolant in the pipe 54 over this section.

Therefore, the present disclosure and the teachings of Furukawa are perfectly consistent in recognizing that the resin in which the windings are cast does not have any heat insulating properties. Even if the Examiner disagrees with the aforementioned description of the teachings of the Furukawa reference, claim 1 still would be patentable over those teachings because in that circumstance, unlike Furukawa, the present Applicants would have recognized that the casting resin is not an effective heat insulator and that additional heat insulation is advantageous in order to protect damage

to the casting resin. If the Examiner still contends that the Furukawa reference teaches that the casting resin itself is some form of insulator, this conventional thinking in the prior art has been completely rejected by the present Applicant.

At the interview, the Examiner noted that in order to make the aforementioned arguments in support of patentability more relevant, it would be preferable for the carrier structure to be defined as being a resin carrier structure, and therefore the subject matter of claim 9 has been embodied in claim 1 in addition to the above-discussed amendments, and claim 9 has been cancelled. Moreover, the Examiner noted that claim 13 states that the heat insulator can be a polymer material, and the Examiner noted that resin is a polymer material, and therefore there was nothing in the literal language of claim 1 to preclude reliance on the resin in the Furukawa reference as corresponding to the claimed heat insulator. It was agreed at the interview that claim 1 would be amended to state that the heat insulator is a non-resinous heat insulator, thereby precluding reliance on the resin component in the Furukawa reference as corresponding to the claimed non-resinous heat insulator. Applicant acknowledges that the present specification does not explicitly use the term "non-resinous" to describe the heat insulator, however, as noted above virtually the entirety of the present disclosure is directed to solving the problems associated with the heat conductance which occurs in commonly used resin materials, and it would make no sense to try to solve those problems by using a heat insulator consisting of resin. Therefore, a person of ordinary skill in the art reading the present disclosure as originally filed definitely receives the overall teaching that the heat insulator should be non-resinous.

Since claim 1 has been amended in this manner, it is not seen necessary to amend claim 13 to delete the possibility of the heat insulator as being a polymer

material. Since claim 1 now requires that the heat insulator be a non-resinous heat insulator, this means that if a polymer material is selected, according to claim 13, as the material for the heat insulator, this polymer material must be non-resinous, since a dependent claim cannot contradict the independent claim from which it depends.

The Furukawa reference, therefore, does not disclose all of the elements of claim 1 nor any of the claims depending therefrom, and does not anticipate any of those claims, and for the above-discussed reasons provides no teachings or suggestions, which would assist a person of ordinary skill in the art in arriving at the subject matter of claims 11-14 of the present application.

All claims of the application are therefore submitted to be patentable over the teachings of the Furukawa reference.

Submitted by,

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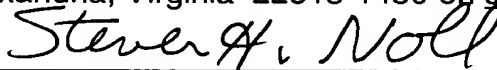
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